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LYE PEELING OF PRODUCTS FOR CANNING

Instructions for use by Community, School, and Institutional Canneries

Community, school, and institutional canneries must keep waste to a minimum in preparing foods for canning or other forms of processing. You will want, therefore, to consider methods which are efficient and adaptable to your processing operation. The factors recognized as desirable in the method adopted for peeling a particular commodity are:

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1. The method must be economical.
2. It must save hand labor.
3. It must save time.
4. It should not be hazardous.
5. It should adapt itself to equipment which might be constructed locally.
6. It must be simple.

For removing the skins of peaches, carrots, white potatoes, sweetpotatoes, and Kieffer pears, lye peeling meets all the above requirements except one. It is hazardous. But with proper precaution, it presents no greater hazard than the steam retorts or the high-temperature scalding baths commonly used for blanching commodities to be processed. The hazards of lye peeling can be reduced to a minimum through correct installation of equipment and through education concerning its use.

Hazards and Safety Methods

Lye will affect wool or leather. Its effect on cotton garments is slight. A small speck of lye or any of the lye solution in the eyes can result in painful injuries and possible impairment of sight.

Lye (caustic soda) is one of the strongest of the alkalies. Bodily contact with lye solution can result in chemical burns unless immediately rinsed with ample water or neutralized with a weak acid, such as vinegar,

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service

AMS - 105

Issued March 1947
Slightly Revised March 1956

boric acid, or lemon juice. Where the open vat method is used, it is essential that operators of lye-peeling equipment wear goggles to prevent any possible accident to the eyes, and rubber gloves and rubber boots to protect their hands and shoes. Boots are indispensable if the equipment used allows the solution to drip in any amount on to the floor.

Lye-Peeling Equipment

Any vat or container used for holding the lye solution should be of either iron or steel construction and its sides should extend considerably above the level of the solution to minimize any possibility of its boiling over on the worker. (See Figure 1.) Aluminum, brass, copper, galvanized iron, tin, or wood should not be used, as the lye will attack these materials. The inside of the vats should never be painted. Lye will remove the paint which, in turn, will contaminate the product. Furthermore, loosened paint constituents may induce foaming and boiling over, thus endangering workers. The bottom of the vat should slope to the drain to allow complete drainage. The drain should be large enough to carry off not only the lye solution but also the gradual accumulation of skins. It should empty directly into the drainage trough or sewer to avoid exposure of the operators to the hazard of possible splashing when the vats are drained.

Methods of Heating Lye Solution

The solution may be heated by one of two methods:

1. Steam coils, such as are used in heating water to boiling when making brine and/or sirup.

2. Gas -- natural, butane, or other applied on the under side of the vat. Do not use open steam jets since the condensed steam will weaken the lye solution.

Temperature of Lye Solution

Experience shows that best results are obtained when the temperature of the solution is as near boiling as possible, never below 200° F. If the temperature of the lye solution falls, efficiency of the peeling operation will drop immediately. Increasing the strength of the lye solution alone will not correct this condition. The stronger the lye solution, the higher will be its boiling point. The temperature must always be increased until a rolling boil is obtained in order to insure proper peeling.

Strength of Solution

It is impossible to set up a definite formula for a lye solution needed to properly peel any given product. To illustrate, ripe peaches peel quicker than those less mature. New potatoes peel faster and with a weaker solution than cured ones. Freshly dug carrots peel more quickly than those which have been in transit or storage for several days or longer. The formula for the starting solution for each product and directions for its proper use can, however, be given. The starting solution is one which will, under

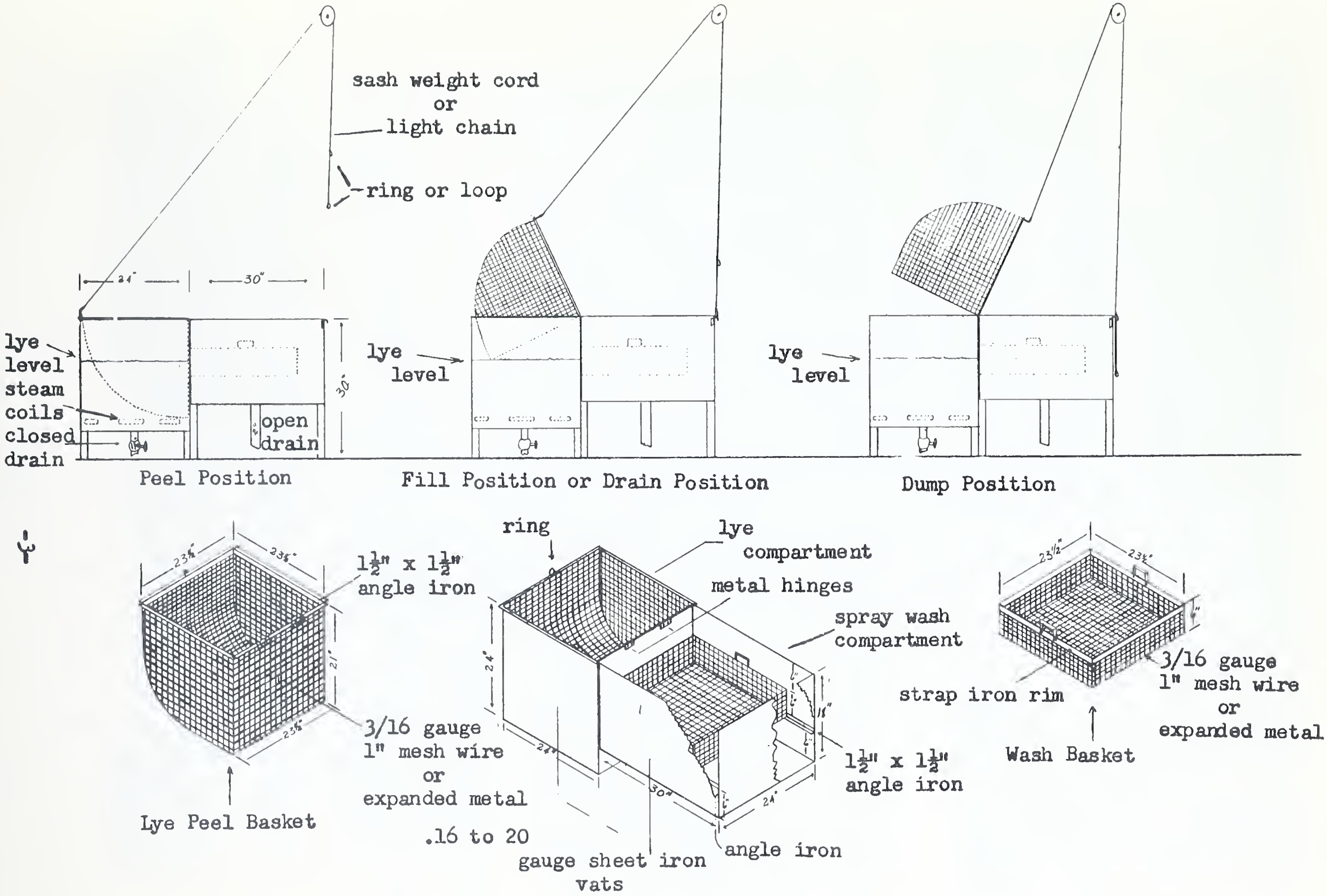

Figure 1 -- Batch type lye peeler with spray wash compartment attached.

perfect conditions, peel efficiently. Its strength is based on the assumption that it will be used at the temperature recommended. This is essential, since actual peeling is accomplished by a combination of temperature and strength of solution. In all instances this starting solution is to be used only as the test solution. If the commodity to be peeled does not emerge in properly peeled condition, small amounts of lye must be added until the desired peeling effect is produced.

The strength of the solution will weaken during the operation and it will be necessary to add additional lye at intervals. This weakening of solution is evidenced by the appearance of the product after it is treated for the proper length of time. If in subsequent washing the skin is not properly removed, more lye should be added to the bath. Lye should never be dumped or thrown into hot water or hot solution. It should be added slowly to prevent foaming or boiling over on to the floor and the feet of workers.

General Procedure of Lye Peeling

The lye bath is never used to remove the skin from the product. It is used only for the purpose of treating the surface and affecting it in such a manner that the skin can be removed easily by a spray wash of water. The product should always be removed from the lye bath with the skin still adhering but in a soft and somewhat gelatinous condition, loose enough to be washed away easily. The removal of too much skin in the lye solution indicates overexposure or too much stirring of the product. Continued overexposure of a product to the lye bath causes gradual thickening of the solution to the point where it can no longer be used and must be replaced. This procedure is expensive, wasteful, and incorrect. The gradual thickening of a lye solution is, of course, a normal occurrence because of accumulated skins, but this can and should be delayed as much as possible for best and most economical operation. All skins should be removed in the first washing operation after treatment of the commodity with lye.

Lye-Peeling Flow Chart

The lye-peeling operation involves these steps:

1. A preliminary washing for carrots, white potatoes, and sweetpotatoes.

2. A short immersion in a hot lye solution in equipment referred to as a lye peeler.

3. The removal from the lye solution and immediate use of sprays of water to remove all skins and lye. Strong sprays are most desirable.

4. A vigorous water rinse and tumbling to remove all traces of lye. An acid neutralizing bath may be used after this wash, if desired. However, the use of plenty of water and close supervision of washing makes this unnecessary. An acid bath for neutralizing lye is not generally used in commercial plants where plenty of water and washing facilities are available.

5. Hand trimming and culling to give a perfectly finished product for canning or other forms of processing. The lye bath and wash will not remove defects from any commodity. They will, however, remove the skin surrounding the defect and in this way focus attention on it.

Peaches

Peaches of the freestone varieties are sufficiently mature for canning in halves or slices when the peach breaks freely from the stone. Cold storage peaches should be allowed to reach room temperature before being peeled.

Peaches should be completely peeled by the lye peeler in a period of time varying from 20 to 45 seconds. The best peeling is obtained and the texture of peaches least affected if fruit is immersed for approximately 30 seconds. Therefore, the strength of the solution at a rolling boil should be that which results in efficient peeling after 30 seconds in the bath.

1. To each 4 gallons of water in the lye peeler, add slowly one 13-ounce can of lye, such as may be obtained in any grocery store, and allow to come to a rolling boil (starting formula).

2. Test the efficiency of the solution by immersing a few peaches for approximately 30 seconds. If, upon removal from the solution, the subsequent spraying with water and then rinsing, peels the peaches perfectly, the solution is correct. If this has not been the result, small amounts of lye should be added until proper peeling is accomplished. Remember, however, that lye peeling does not eliminate any defects or bruises. It will always be necessary to remove these by hand after the peaches are peeled.

3. Pit all freestone peaches to be canned as slices or halves before lye peeling. Only peaches which are to be canned or preserved whole, such as peach pickles, are lye peeled before pitting. Pitting before lye peeling is recommended for several reasons:

    (A) A lye-peeled whole peach is too slippery to handle for safe pitting.

    (B) Lye peeling removes the "rag" or the "string" from the pit cavity. This rag or string tends to impart a slightly bitter flavor to the canned product. It is also rather unattractive in appearance when canned.

    (C) The hot lye bath blanches the individual peach halves on all sides, thus inactivating the enzymes sufficiently to prevent browning while the peaches are being inspected and trimmed.

4. Peaches need not be washed before lye peeling. After a sufficient quantity is pitted for a batch, place them immediately into the hot lye solution. The length of immersion and/or treatment should vary from 20 to 45 seconds, never more than 60 seconds, as the texture of the fruit will be affected.

5. Remove peaches from lye peeler and place immediately under a cold water spray. Hold under spray until the skin and discoloration from the lye treatment are removed. Proper washing of the skin surface is accomplished easily under normal conditions but care should be exercised to insure complete removal of residual lye from the pit cavity. If halves are not properly washed the flavor of the processed peach will be impaired. Therefore, it is advisable to turn each half by hand and hold it under the spray until the cavity is thoroughly cleansed. (Rubber gloves should be worn to avoid lye burns and skin irritation that would otherwise result from continued exposure to the lye solution.)

6. Rinse thoroughly in clear water with considerable tumbling of the peach in the water.

7. Inspect, trim, and pack into cans.

Kieffer Pears

Kieffer pears are a very hard, crisp-textured variety grown throughout the country. To hand peel Kieffer pears it is recommended that they be given a 25- to 30-second bath in boiling water in order to make the outer surface pliable and thus facilitate the operation.

Regardless of the peeling method used, Kieffer pears should be allowed to reach full maturity before processing. They may be completely peeled by lye:

1. To each 4 gallons of water in the lye peeler, slowly add four 13-ounce cans of lye, such as may be purchased from any grocery store, and allow to come to a rolling boil (starting formula).

2. Immerse pears into lye solution and stir slowly from 4-1/2 to 7 minutes.

3. Remove pears from the lye peeler and place immediately under a cold-water spray. All skins can be removed in this operation if care is exercised in the spray washing, and if the pears have been adequately treated by hot lye.

4. Wash thoroughly in cold water. If residual lye or gelatinous substance remains, it can be removed with a fiber brush while holding the pear under water. (Rubber gloves should be worn to avoid lye burns and skin irritation that would otherwise result from continued exposure to the lye solution.)

5. Place pears immediately in water to which salt or acid has been added to prevent oxidation during trimming. Pears oxidize very quickly and should be kept in this protective solution during any hold-over period of preparation.

6. Inspect, trim, and cut pears into halves or quarters and core.

Carrots

Freshly dug carrots are lye peeled with a very short treatment, usually for about 1-1/2 minutes. Carrots which have been shipped in or held in storage from 5 to 10 days will require treatment for 2-1/2 minutes or more. The skin should slip off freely and leave the carrots smooth and clean. Practically no additional trimming will be necessary if the carrots are of good quality.

1. To each 4 gallons of water in the lye peeler, add slowly two 13-ounce cans of lye, such as may be purchased in any grocery store, and allow the solution to come to a rolling boil (starting formula).

2. Wash all dirt and other extraneous matter from carrots.

3. Immerse carrots in lye solution and stir slowly with a wooden paddle until the skins commence to come off easily.

4. Remove carrots from lye peeler and place immediately under a cold-water spray. All skin can be removed easily in this manner if care is exercised.

5. Wash thoroughly in cold water. If skin still remains on any portion of the carrot, it may be removed easily by brushing the carrot with a fiber brush while it is held under water. (Rubber gloves should be worn to avoid lye burns and skin irritations that would otherwise result from continued exposure to the lye solution.)

6. Inspect, trim, and cut as desired for canning. Since washing may not remove all traces of lye solution in deep pits and cuts, special care should be given them in trimming.

White Potatoes

New potatoes peel more quickly than those which have been stored for some time and allowed to cure. Any lye-peeling solution must depend entirely on tests to determine the proper strength of solution to use in peeling any given lot of potatoes. Potatoes may be peeled so perfectly by lye that the eyes are completely removed in the spray wash following the lye bath. The instructions given for lye peeling white potatoes apply generally to all varieties.

1. To each 4 gallons of water in the lye peeler, slowly add three 13-ounce cans of lye, such as may be purchased from any grocery store, and allow to come to a rolling boil (starting formula).

2. Wash all dirt and other extraneous matter from the potatoes.

3. Immerse in lye solution for from 3-1/2 to 6 minutes. The potatoes should be stirred slowly while in the solution and removed from the solution when they become dark yellow. When this step is reached, it will be noted that stirring the potatoes causes the skin to peel off in several places.

4. Remove potatoes from lye peeler and place under a strong cold-water spray. This operation will remove the skins.

5. Wash thoroughly in cold water and, if any eyes remain after spraying, they can be removed by using a brush on the potatoes while they are held under water. (Rubber gloves should be worn to avoid lye burns and skin irritations that would otherwise result from continued exposure to the lye solution.)

6. Inspect, trim, and cut, if necessary, for canning. Since washing may not remove all traces of lye solution at stem ends or in deep pits and cuts, special care should be given them in trimming.

Sweetpotatoes

Sweetpotatoes for canning can be peeled more quickly by a lye solution than by hand. Another advantage of this method of peeling is that it blanches the sweetpotatoes approximately 1/8 inch to 1/4 inch in depth. This blanching prevents discoloration from oxidation while the sweetpotatoes are inspected, trimmed, and prepared for the can. This is an important factor in the processing of sweetpotatoes. Freshly dug sweetpotatoes peel in much less time than those which have been in storage for months.

1. To every 4 gallons of water in the lye peeler, add slowly four 13-ounce cans of lye, such as may be purchased in any grocery store, and allow to come to a rolling boil (starting formula).

2. Wash all dirt and other extraneous matter from the sweetpotatoes.

3. Immerse sweetpotatoes in lye solution and stir slowly. They should remain in the solution from 4-1/2 to 8-1/2 minutes, depending upon the amount of cure to which the sweetpotatoes have been subjected. They should be removed as soon as the skins commence to come off when the sweetpotatoes are stirred.

4. Remove sweetpotatoes from lye solution and place under a strong cold-water spray. This operation will remove the skins.

5. Wash thoroughly in cold water. Any skin remaining in growth cracks or crevices can be removed with a fiber brush while holding the sweetpotato under water. (Rubber gloves should be worn to avoid lye burns and skin irritation that would otherwise result from continued exposure to the lye solution.)

6. Inspect, trim, and prepare sweetpotatoes for canning. Since washing may not remove all traces of lye solution at stem ends or in deep pits and cuts, special care should be given them in trimming.

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